

Wisconsin Cardiovascular Disease Surveillance Summary

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Wisconsin Department of Health and Family Services
Division of Public Health
Bureau of Chronic Disease Prevention and Health Promotion*

Introduction



Cardiovascular disease (CVD) is the leading cause of death and disability in the United States and in Wisconsin. CVD is a major public health concern and economic cost to the people of Wisconsin.

CVD is defined as all diseases of the heart and blood vessels and includes ischemic heart disease, cerebrovascular disease (stroke), congestive heart failure, hypertensive disease and atherosclerosis. Despite three decades of declining CVD death rates, cardiovascular disease remains the leading cause of death for men and women in the United States and in Wisconsin.

According to data from the Department of Health and Family Services (DHFS), Division of Health Care Financing, Bureau of Health Information, in 2000, 40% of all Wisconsin deaths (18,379) were due to cardiovascular disease. This includes 9,448 deaths due to coronary heart disease and 3,580 to stroke. In addition, there were almost 94,000 hospitalizations for cardiovascular disease in Wisconsin, accounting for over \$1.6 billion in charges associated with those hospitalizations.

Deaths and disability from cardiovascular disease are influenced by modifiable risk factors such as tobacco use, physical inactivity, high blood pressure, high cholesterol, poor nutrition, and related conditions such as diabetes, overweight, and obesity. Because it is the leading cause of death and many of the risk factors are well documented and preventable, cardiovascular disease is currently a public health priority in Wisconsin and the United States. By creating environments that support or encourage healthier lifestyles, people in Wisconsin could reduce much of the burden and disability from cardiovascular disease.

The Cardiovascular Health Program, Bureau of Chronic Disease Prevention and Health Promotion, Wisconsin Division of Public Health produced this report with the guidance of the Cardiovascular Health Epidemiology Task Force. This independent task force was comprised of epidemiologists, practitioners, advocates and others from organizations throughout the state (see acknowledgements).

The Wisconsin data in this report were produced by the DHFS, Division of Health Care Financing (DHCF), Bureau of Health Information. The national trend data were provided by the American Heart Association, Biostatistics Consultant, National Center. The purpose of this report is to present the current status in Wisconsin of cardiovascular disease and mortality, CVD hospitalizations with an estimate of associated charges, and the prevalence CVD risk factors. The emphasis of the report will be on coronary heart disease and stroke.

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Key Findings



Unless otherwise stated, all data are from 2000.

- Ischemic (coronary) heart disease (CHD) accounted for 9,448 of the deaths and cerebrovascular disease (stroke) for 3,580.
- Cardiovascular disease (CVD), including heart disease and stroke, is consistently the leading cause of mortality of Wisconsin residents, accounting for over 18,000 deaths or 40% of all deaths in Wisconsin.
- Although death rates for CHD and stroke have declined in Wisconsin and the United States, these diseases remain the first and third leading causes of death respectively. In 1999, Wisconsin ranked 20th in the nation for CHD deaths and 38th for stroke mortality. (A rank of 1 represents the lowest, or best, mortality rate.)
- CVD is not just a disease of old age; overall, 20% of male and 7% of female coronary heart disease deaths were in persons less than 65 years old for the years 1996-2000.
- For the years 1996-2000, the percentage of deaths before age 65 years from coronary heart disease was even higher for blacks - 44% for black males and 29% for black females.
- Thirty-two percent of coronary heart disease deaths and 22% of stroke deaths occur before age 75 for the years 1996-2000.
- Almost 94,000 hospitalizations or 16% of all hospitalizations were related to cardiac diagnoses.
- Cardiovascular-related hospitalization charges amounted to more than \$1.6 billion.
- Overweight and obesity are known risk factors for CVD mortality and morbidity. More than half (58%) of Wisconsin adults are either overweight (BMI greater than or equal to 25) or obese (BMI greater than or equal to 30).
- About one in four Wisconsin adults smoke; this rate has remained fairly constant from 1990 to 2000 (23-26%), despite public awareness of the detrimental effects of smoking.
- Lack of physical activity is a significant risk factor for CVD; only 23% of Wisconsin adults fulfill the recommended amount of 30 minutes or more of moderate physical activity on most days of the week.
- Many health risk behavior patterns are established in youth; 33% of high school students smoke cigarettes, and 25% are overweight or at risk for being overweight.

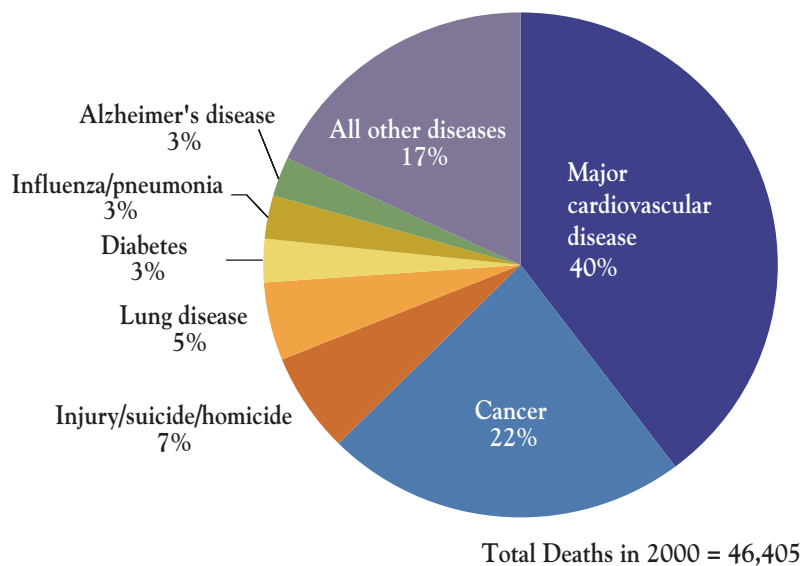


Mortality (Deaths)



Cardiovascular disease, including heart disease and stroke, was the leading cause of death (18,379 deaths) among Wisconsin residents in 2000, accounting for almost 40% of all deaths.¹

Figure 1:
Leading Underlying Causes of Death, Wisconsin, 2000



Source: Wisconsin Deaths 2000, Bureau of Health Information, DHCF,
Wisconsin Department of Health and Family Services

- In 2000 there were more deaths in Wisconsin from cardiovascular disease than for cancer, automobile crashes, suicide, homicide, and AIDS combined.

Mortality (Deaths)



Major Cardiovascular Disease (CVD), which accounted for 40% of all resident deaths in Wisconsin (see Figure 1), is comprised of several categories of diseases. Table 1 shows the categories included in Major CVD, with the number of deaths in each category and the percentage of the total deaths in the category. Major CVD includes Diseases of the Heart, Primary Hypertension, Stroke, Atherosclerosis and Other Diseases of the Circulatory System. Diseases of the Heart is further broken down to into Ischemic (Coronary) Heart Disease, Hypertensive Heart Disease, Congestive Heart Failure and Other Diseases of the Heart. (See technical notes for International Classification of Disease (ICD) codes associated with the categories.)



Table 1:
Major Cardiovascular Disease (CVD) Deaths, by
Category, Wisconsin, 2000

DISEASE CATEGORY	NUMBER OF DEATHS	% OF CVD DEATHS
Major Cardiovascular Disease	18,379	100%
Diseases of the Heart	13,611	74.0%
Ischemic Coronary Heart Disease	9,448	(51.4%)*
Hypertensive Heart Disease	430	(2.3%)*
Congestive Heart Failure	1,381	(7.5%)*
Other Diseases of the Heart	2,352	(12.8%)*
Primary Hypertension/Hypertensive Renal Disease	300	1.6%
Cerebrovascular Disease (Stroke)	3,580	19.5%
Atherosclerosis	235	1.3%
Other Diseases of the Circulatory System	653	3.6%

Source: Wisconsin Deaths 2000, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

* The numbers included in () make up the 74% of deaths in the category Diseases of the Heart

- Included in Major Cardiovascular Disease is Diseases of the Heart, which accounted for 13,611 of Wisconsin resident deaths in 2000. This includes 9,448 deaths for Ischemic (Coronary) Heart Disease, which is 51% of Major CVD deaths and 20% of all Wisconsin deaths. Congestive Heart Failure, also in this category, accounted for 1,381 Wisconsin resident deaths in 2000.
- Cerebrovascular Disease, or stroke, accounted for 3,580 deaths or 19.5% of Major CVD deaths and 8% of all Wisconsin deaths. Stroke is the third leading cause of all Wisconsin resident deaths (see Figure 1).

Mortality (Deaths)

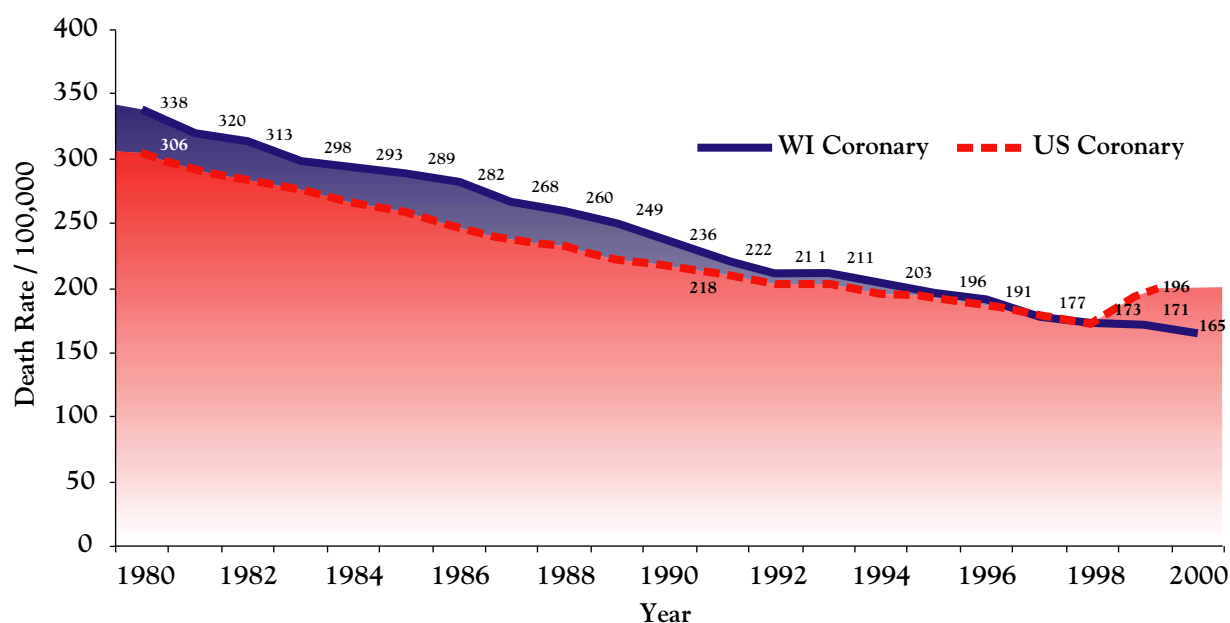


Although death rates from cardiovascular disease (CVD) have declined since 1980, it still remains the leading cause of death in Wisconsin and the nation.² This section demonstrates trends in coronary heart disease, congestive heart failure, and stroke mortality rates in Wisconsin and the United States since 1980.

In 1999 (the most recent national data), Wisconsin ranked 20th in coronary heart disease mortality (1st being the lowest, or best, mortality rate and 52nd the highest).²

Figure 2:

Age-Adjusted Mortality Rates* for Coronary Heart Disease, Wisconsin, 1980-2000 and the United States, 1980-1999**



Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services & American Heart Association (AHA), Biostatistics Consultant, National Center, Dallas TX

* Data labels are shown for all the Wisconsin rates, but for only 1980, 1990, and 1999 for the US rates.

** The Wisconsin data (ICD9: 410-414, 429.2; ICD10: I20-I25) were computed by the Wisconsin Bureau of Health Information and the national data by the American Heart Association (ICD9: 410-414; ICD10: I20-I25). All rates are age-adjusted to the US 2000 Standard Population and expressed in deaths/100,000 population (see Technical Notes).

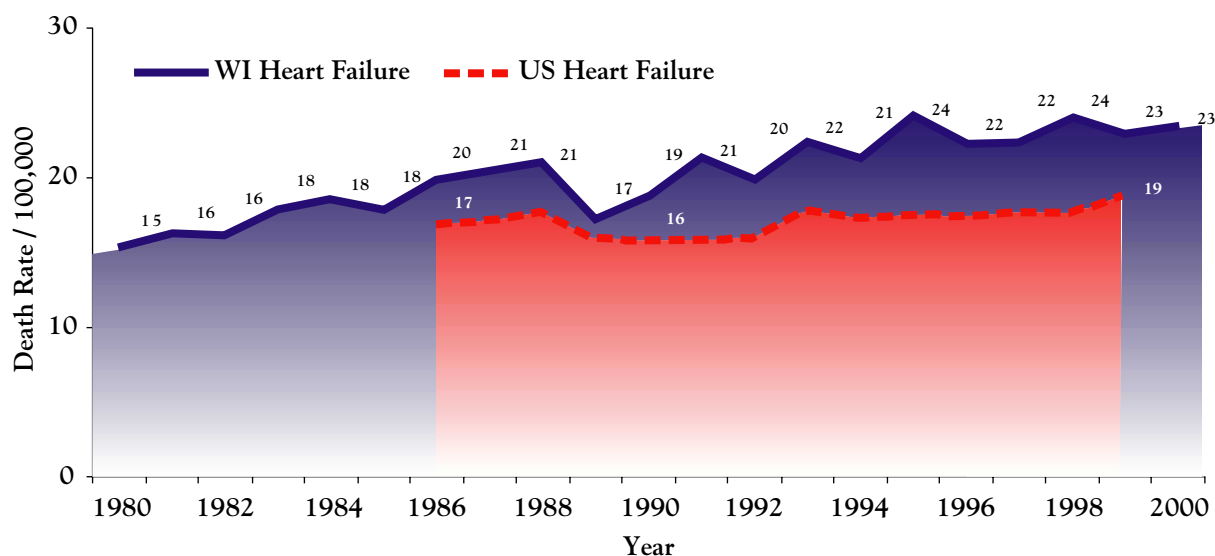
- Coronary heart disease (CHD) is the major category in CVD; the death rate in 2000 for CHD in Wisconsin was 165 deaths/100,000 population. There was a 51% decline from the rate in 1980 of 338 deaths/100,000 population. This decline, however, is slowing. From 1980-1990 the rate of decline averaged 10.2% per year compared to 6.5% per year from 1990-2000.

Mortality (Deaths)



Deaths from congestive heart failure are increasing in Wisconsin and nationally.² American Heart Association estimates that about 22% of men and 46% of women who survive a heart attack will be disabled from congestive heart failure within six years.²

Figure 3:
Age-Adjusted Mortality Rates* for Congestive Heart Failure, Wisconsin, 1980-2000 and the United States, 1986-1999**



Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services & American Heart Association (AHA), Biostatistics Consultant, National Center, Dallas TX

*Data labels are shown for all the Wisconsin rates, but for only 1986, 1990, and 1999 for the US rates. 1986 was the first year US data was available from the American Heart Association.

**The Wisconsin data (ICD9: 428; ICD10: I50) were computed by the Wisconsin Bureau of Health Information and the national data by the American Heart Association (ICD9: 428; ICD10: I50). All rates are age-adjusted to the US 2000 Standard Population and expressed in deaths/100,000 population (see Technical Notes.)

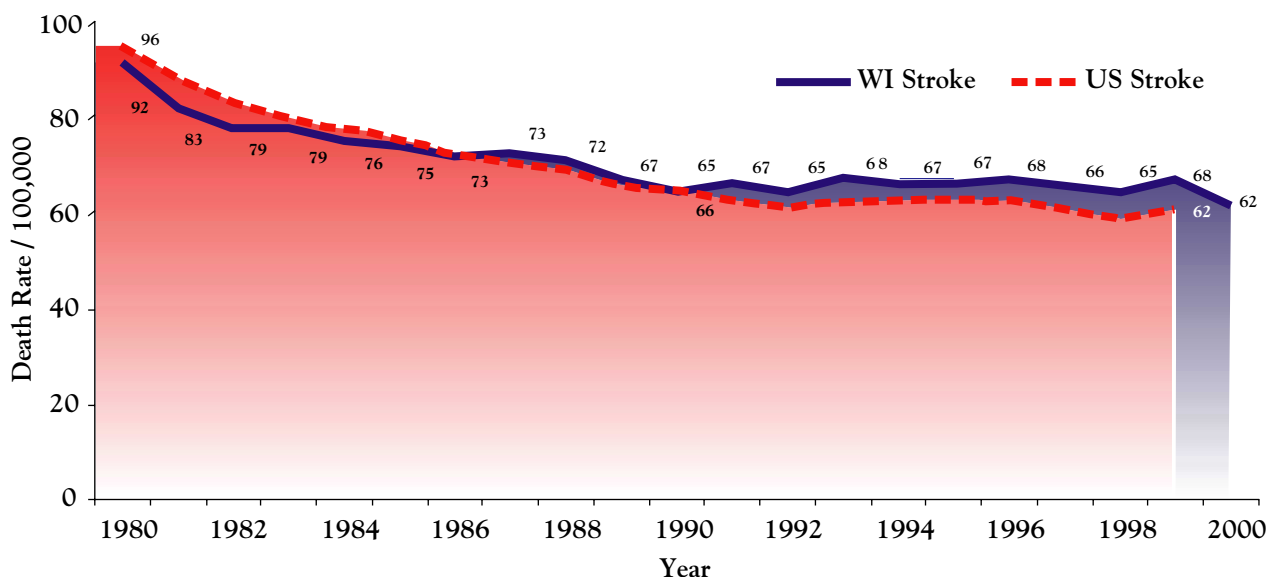
- Unlike the trend for most cardiovascular disease, mortality rates for congestive heart failure are increasing.
- In Wisconsin from 1980-2000 the mortality rates increased from 15 to 23 deaths/100,000 or 53%. Wisconsin had consistently higher rates from 1986-1999, when compared with the US.

Mortality (Deaths)



Stroke is the leading cause of serious long-term disability in the United States. In 1999 there were more than 1.1 million adults who reported difficulty with functional limitations and activities of daily living resulting from stroke.²

Figure 4:
Age-Adjusted Mortality Rates* for Stroke, Wisconsin, 1980-2000
and the United States, 1980-1999**



Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services & American Heart Association (AHA), Biostatistics Consultant, National Center, Dallas TX

* Data labels are shown for all the Wisconsin rates, but for only 1980, 1990, and 1999 for the US rates.

** The Wisconsin data (ICD9: 430-438; ICD10: I60-69) were computed by the Wisconsin Bureau of Health Information and the national data by the American Heart Association (ICD9: 430-438; ICD10: I60-69). All rates are age-adjusted to the US 2000 Standard Population and expressed in deaths/100,000 population (see Technical Notes).

- During the time period from 1980 to 2000, stroke mortality rate declined 31% in Wisconsin and 34% nationally.
- Since 1986, stroke mortality rate in Wisconsin has been greater or equal to the US mortality rate. In 1999 (the most recent national data), Wisconsin ranked 38th in stroke deaths (1st being the lowest, or best, mortality rate and 52nd the highest).²

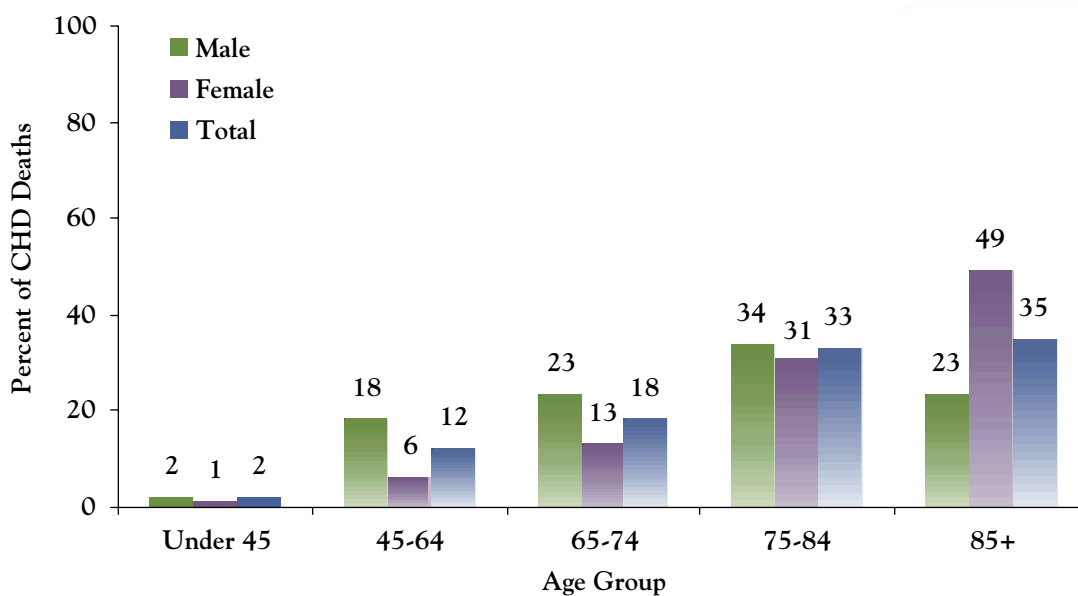
Mortality (Deaths)



Approximately 32% of deaths from coronary heart disease and 22% of deaths from stroke occur before age 75 years. These deaths occur during some of the most productive years of life and dispel the myth that CVD is only a concern for the elderly. More blacks die prematurely from coronary heart disease and stroke than do whites. Figures 5 and 6 show the percentage of deaths from coronary heart disease and stroke by age group and sex, and Table 2 shows percentages of premature deaths by race.



Figure 5:
Percentage of Coronary Heart Disease (CHD) Deaths,
by Age Group and Sex, Wisconsin, 1996-2000



Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

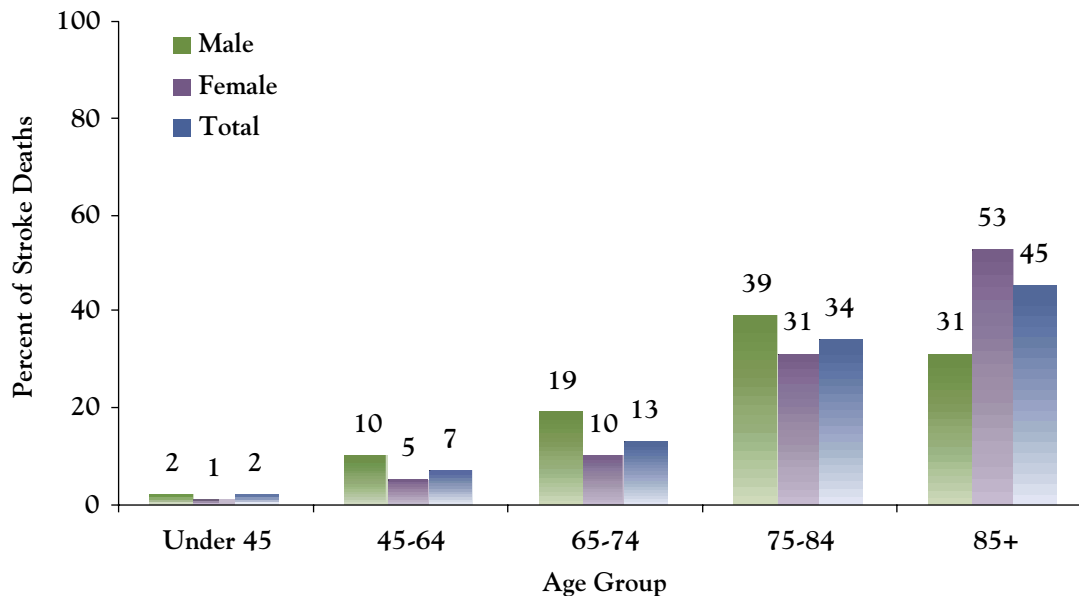
- Twenty percent of males and 7% of females who die from coronary heart disease die before age 65 years.
- Forty-three percent of males and 20% of females who die from coronary heart disease die before age 75 years.
- Almost half of females (49%) die from coronary heart disease die at age 85 years or older compared with only 23% of males who are 85 years or older.
- One in three deaths from coronary heart disease are considered premature or occur to people under age 75 years.

Mortality (Deaths)



Stroke is the third leading cause of death in Wisconsin accounting for 18,428 deaths from 1996-2000.

Figure 6:
Percentage of Stroke Deaths, by Age Group and Sex,
Wisconsin, 1996-2000



Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

- Twelve percent of males and 6% of females who die from stroke die before age 65 years.
- This percentage increases to a total of 31% of males and 16% of females who die from stroke before age 75 years.
- More than half of females (53%) who die from stroke die at age 85 years or older compared with only 31% of males dying at age 85 years or older.

Mortality (Deaths)



Table 2:
Premature Coronary Heart Disease and Stroke Deaths,
by Race and Sex, Wisconsin, 1996-2000

	% OF CORONARY HEART DISEASE DEATHS		% OF STROKE DEATHS	
	Under 65 yrs	Under 75 yrs*	Under 65 yrs	Under 75 yrs*
Black Males	44.3%	70.4%	37.5%	63.7%
White Males	19.4%	42.5%	10.3%	28.6%
Black Females	28.6%	53.6%	28.9%	41.4%
White Females	6.2%	18.9%	5.3%	14.9%

*Includes deaths before 65 years of age

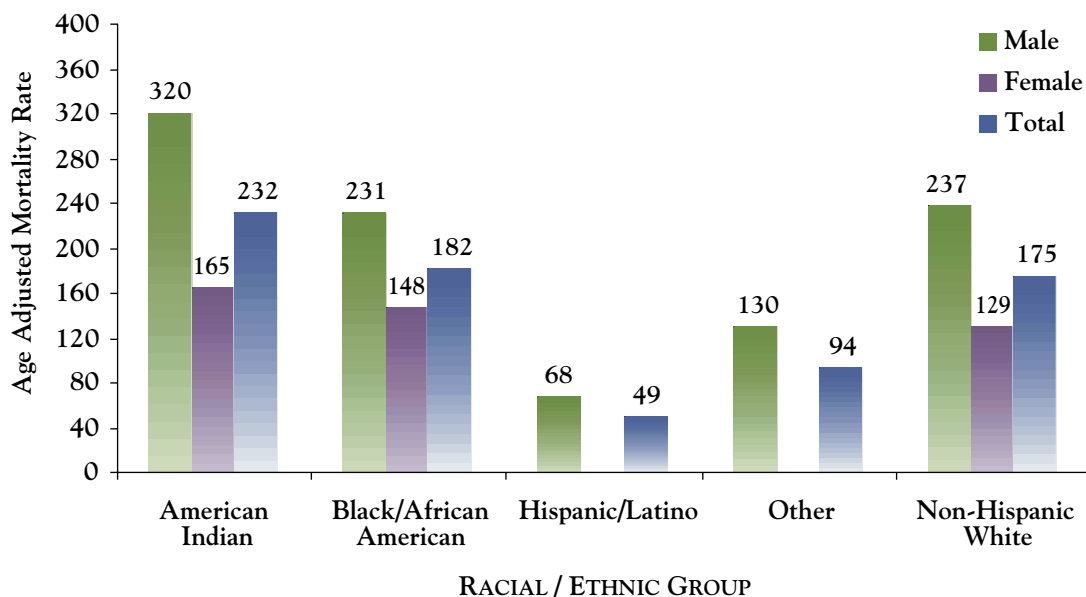
Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

- More blacks die prematurely from coronary heart disease and stroke than whites.
- Of those who died from coronary heart disease, 44% of black men, 19% of white men, 29% of black females, and 6% of white females died before age 65.
- Of those who died from stroke, 38% of black men, 10% of white men, 29% of black females, and 5% of white females died before age 65.
- Although dying before age 75 years is now considered premature death, there is a larger disparity between blacks and whites among those dying before age 65 years. There is also a marked disparity between black women and white women dying prematurely from stroke.
- For both blacks and whites, more men die prematurely than women for both coronary heart disease and stroke. The highest percentage of premature death is for coronary heart disease among black men.

Mortality (Deaths)



Figure 7:
Age-Adjusted Mortality Rates for Coronary (Ischemic) Heart Disease,
by Race/Ethnicity and Sex, Wisconsin, 1996-2000



All rates are age-adjusted to the US 2000 Standard Population and expressed in deaths/100,000 population. Rates were not reported if there were less than 50 deaths for that subgroup in the 5-year period (see Technical Notes).

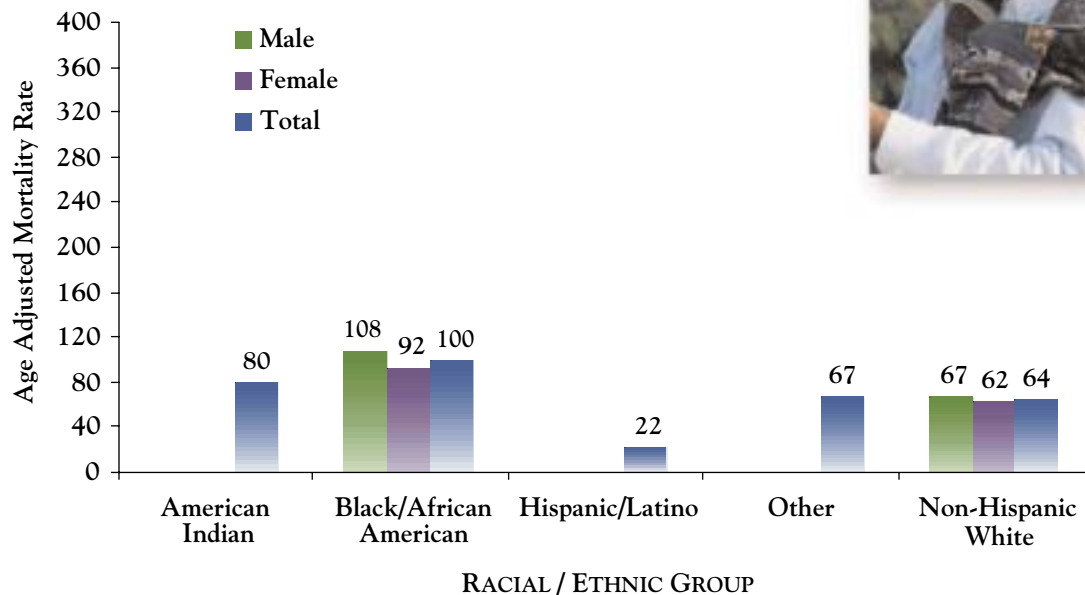
Source: Research and Records Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

- Coronary heart disease mortality rates in Wisconsin, as in the nation, differ by race/ethnicity and sex.
- In Wisconsin, the highest rate is among American Indian males, followed by white males, and then black males. The rate in American Indian males is 29% higher than black males and 26% higher than white males.
- Rates are higher for males than females for every racial/ethnic group. The rates are almost double for males compared to females for American Indians (1.9 fold) and whites (1.8 fold) and are 1.6 fold higher in blacks.
- Mortality rates for American Indian and black females are 22% and 13% higher, respectively, in comparison to white females.

Mortality (Deaths)



Figure 8:
Age-Adjusted Mortality Rates for Stroke,
by Race and Sex, Wisconsin, 1996-2000



All rates are age-adjusted to the US 2000 Standard Population and expressed in deaths/100,000 population. Rates are not reported if there were less than 50 deaths for that subgroup in the 5-year period (see Technical Notes).

Source: Research and Records Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

- Mortality rates for stroke in Wisconsin differ by race and ethnicity.
- In Wisconsin, the highest rate is among blacks, followed by American Indians, then other races (including Asians), whites, and Hispanics/Latinos.
- Stroke death rates are 25% higher for American Indians and 56% higher for blacks when compared with whites.
- Rates are not reported by sex for American Indians, Hispanics/Latinos, and other races because there were fewer than 50 deaths in the five-year period.

Mortality (Deaths) by County



The following section illustrates the difference in coronary heart disease rates and stroke rates in Wisconsin counties.

This section includes a table and a map for coronary heart disease (Table 3 and Map 1) and stroke (Table 4 and Map 2). The tables report the annual average number of deaths and the age-adjusted rate for two time periods (1986-1990 and 1996-2000) for each county, with a final column showing the percent difference in the county age-adjusted rate for those two time periods. The maps demonstrate age-adjusted rates in Wisconsin counties by quartiles.

SUMMARY FINDINGS

Coronary Heart Disease

- For coronary heart disease, for 1996-2000, there was an average of 9,727 deaths/year for a statewide age-adjusted rate of 174.4/100,000 population.
- The range of the age-adjusted coronary heart disease mortality rate among counties was from 118.6 to 237.0 deaths/100,000 population.
- For the period 1986-1990, there was an average of 12,271 coronary heart disease deaths/year for a statewide age-adjusted rate of 257.1.
- Mortality from coronary heart disease declined 32% between these two time periods (1986-1990 vs. 1996-2000). A decline was seen in every county except one, ranging from a decline of 1% to 47%.

Stroke

- For stroke, for 1996-2000, there was an average of 3,686 deaths/year for an age-adjusted rate of 65.1/100,000 population.
- The range of the age-adjusted stroke rates among counties was from 40.3 to 85.6 deaths/100,000 population.
- For the period 1986-1990, there was an average of 3,295-stroke deaths/year for a statewide age-adjusted rate of 69.4.
- Statewide mortality from stroke declined 6% between these two time periods. The difference for age-adjusted stroke rates was variable in counties ranging from a decline of 51% to an increase of 43%.

Table 3: Coronary Heart Disease Mortality Rates, by County, Wisconsin, 1986-1990 and 1996-2000

County	Annual Average No. Deaths 1986-90	Annual Average No. Deaths 1996-2000	Age-Adj. Mortality Rate 1986-90	Age-Adj. Mortality Rate 1996-2000	% Change in Age-Adj. Mortality Rate	County	Annual Average No. Deaths 1986-90	Annual Average No. Deaths 1996-2000	Age-Adj. Mortality Rate 1986-90	Age-Adj. Mortality Rate 1996-2000	% Change in Age-Adj. Mortality Rate
WI Total	12,271.0	9,726.6	257.1	174.4	-32.2%	Marathon	218.2	155.0	220.9	118.6	-46.3%
Adams	48.6	48.2	282.7	183.2	-35.2%	Marinette	136.8	148.2	247.6	232.7	-6.0%
Ashland	60.2	45.6	232.5	205.5	-11.7%	Marquette	37.4	31.2	195.2	148.0	-24.2%
Barron	126.8	113.4	237.7	194.5	-18.2%	Menominee	8.2	5.4	*	*	*
Bayfield	38.0	31.2	214.3	152.8	-28.7%	Milwaukee	2646.4	1870.4	276.4	191.3	-30.8%
Brown	370.8	355.0	243.7	177.8	-27.0%	Monroe	109.4	90.0	265.7	210.5	-20.8%
Buffalo	38.2	25.8	192.8	141.3	-26.7%	Oconto	79.8	61.8	221.9	146.0	-34.2%
Burnett	42.6	27.0	219.3	122.6	-44.1%	Oneida	104.0	82.8	269.2	168.4	-37.4%
Calumet	59.4	44.2	217.0	120.1	-44.6%	Outagamie	267.8	231.6	229.5	158.7	-30.8%
Chippewa	157.6	122.0	274.4	185.8	-32.3%	Ozaukee	115.4	116.8	232.4	154.7	-33.4%
Clark	101.4	76.4	223.6	171.8	-23.2%	Pepin	25.4	19.4	213.3	165.4	-22.5%
Columbia	135.8	106.8	226.9	172.3	-24.1%	Pierce	63.4	54.5	203.7	188.1	-7.7%
Crawford	54.8	38.0	248.0	169.8	-31.6%	Polk	98.6	83.8	222.5	171.5	-22.9%
Dane	581.8	441.4	233.1	137.4	-41.1%	Portage	121.8	99.6	247.3	172.6	-30.2%
Dodge	233.0	208.4	270.6	209.2	-22.7%	Price	48.8	44.8	208.0	168.4	-19.0%
Door	66.4	60.4	181.9	159.6	-12.3%	Racine	412.8	313.2	284.9	170.3	-40.2%
Douglas	141.8	108.8	291.8	202.8	-30.5%	Richland	52.6	42.4	234.2	163.1	-30.4%
Dunn	82.2	57.2	225.8	154.3	-31.7%	Rock	378.0	271.4	302.5	172.9	-42.8%
Eau Claire	189.2	121.2	247.1	130.2	-47.3%	Rusk	54.6	42.0	284.4	188.3	-33.8%
Florence	12.2	12.6	206.9	204.2	-1.3%	St Croix	100.2	96.0	220.8	188.7	-14.3%
Fond du Lac	236.4	174.4	247.2	154.6	-37.5%	Sauk	150.0	117.0	260.2	186.9	-28.2%
Forest	32.6	30.4	276.4	222.1	-19.6%	Sawyer	47.4	39.2	252.2	169.2	-32.9%
Grant	139.4	122.8	245.4	208.8	-14.9%	Shawano	154.6	133.0	323.8	235.4	-27.3%
Green	79.6	65.6	218.6	159.5	-27.0%	Sheboygan	257.2	183.6	229.4	139.3	-39.3%
Green Lake	65.0	52.6	238.6	168.7	-29.3%	Taylor	55.4	43.4	251.9	174.2	-30.9%
Iowa	59.4	47.2	268.3	195.7	-27.0%	Trempealeau	103.0	74.6	284.3	184.8	-35.0%
Iron	22.0	24.4	220.1	237.0	7.7%	Vernon	93.8	69.2	238.4	179.1	-24.9%
Jackson	58.2	53.0	274.8	228.5	-16.9%	Vilas	63.8	62.2	242.2	185.5	-23.4%
Jefferson	168.0	135.0	244.5	183.2	-25.1%	Walworth	223.4	172.4	282.1	180.1	-36.2%
Juneau	70.0	63.6	256.3	200.8	-21.7%	Washburn	46.8	47.8	259.9	222.3	-14.5%
Kenosha	322.0	257.2	301.1	188.1	-37.5%	Washington	180.8	163.4	271.7	161.5	-40.6%
Kewaunee	50.60	34.2	226.1	135.0	-40.3%	Waukesha	541.0	566.8	284.2	191.3	-32.7%
La Crosse	218.6	160.8	225.0	148.4	-34.0%	Waupaca	196.8	150.0	290.1	214.0	-26.2%
Lafayette	48.2	39.0	250.5	199.2	-20.5%	Waushara	69.8	67.0	250.7	219.9	-12.3%
Langlade	75.0	58.8	298.2	196.3	-34.2%	Winnebago	305.0	216.2	225.9	131.6	-41.7%
Lincoln	92.4	73.0	259.6	198.0	-23.7%	Wood	193.4	138.6	241.1	152.4	-36.8%
Manitowoc	231.0	186.4	255.8	171.7	-32.9%						

Annual average number of deaths calculated by dividing total deaths for the period (1986-1990 and 1996-200) by five.

All rates are age-adjusted to the US 2000 Standard Population and expressed in deaths/100,000 population (see Technical Notes).

* Rates and percent change are not reported if there were less than 50 deaths over the five-year period.

Percent change measures change in the age-adjusted rate from 1986-1990 to 1996-2000

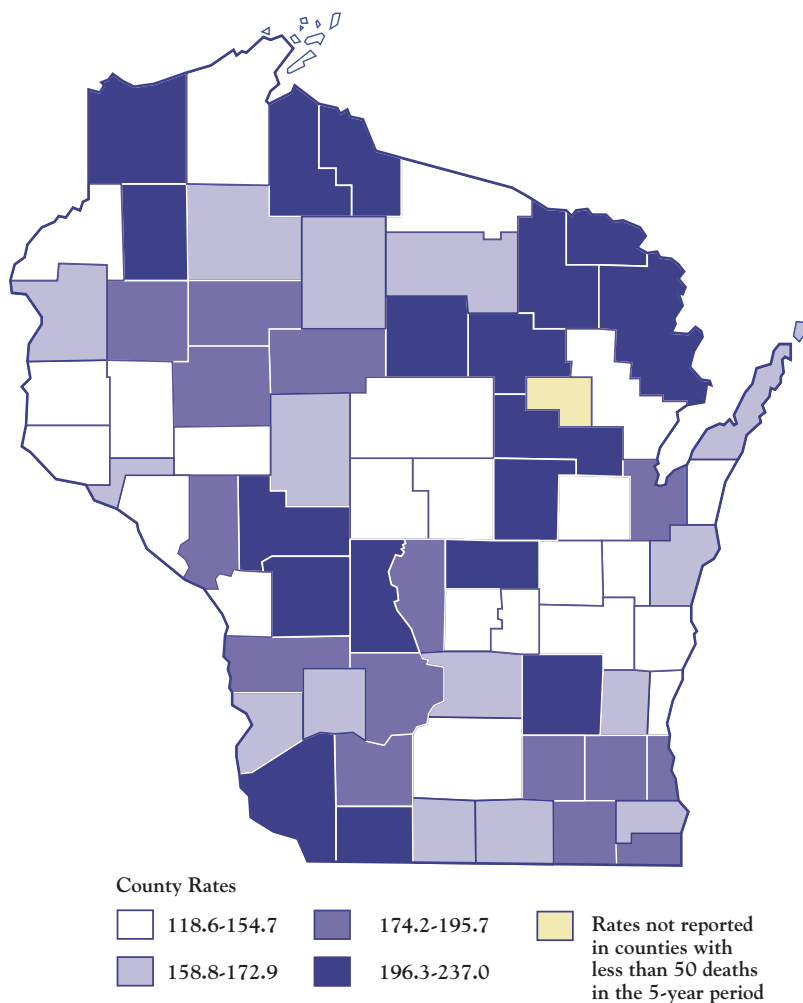
Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

Mortality (Deaths) by County



Map 1:
Age-Adjusted Coronary Heart Disease Mortality Rates, by County,
Wisconsin, 1996-2000

Wisconsin rate: 174.4 deaths/100,000 population



Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

- For coronary heart disease, for 1996-2000, there was an average of 9,727 deaths/year for a statewide age-adjusted rate of 174.4/100,000 population.
- The range of the age-adjusted coronary heart disease mortality rate among counties was from 118.6 to 237.0 deaths/100,000 population.
- For the period 1986-1990, there was an average of 12,271 coronary heart disease deaths/year for a statewide age-adjusted rate of 257.1.
- Mortality from coronary heart disease declined 32% between these two time periods (1986-1990 vs. 1996-2000). A decline was seen in every county except one, ranging from a decline of 1% to 47%.

Table 4: Stroke Mortality Rates, by County, Wisconsin, 1986-1990 and 1996-2000

County	Annual Average No. Deaths 1986-90	Annual Average No. Deaths 1996-2000	Age-Adj. Mortality Rate 1986-90	Age-Adj. Mortality Rate 1996-2000	% Change in Age-Adj. Mortality Rate	County	Annual Average No. Deaths 1986-90	Annual Average No. Deaths 1996-2000	Age-Adj. Mortality Rate 1986-90	Age-Adj. Mortality Rate 1996-2000	% Change in Age-Adj. Mortality Rate
WI Total	3,295	3,686	69.4	65.1	-6.2%	Marathon	65.6	62.4	67.2	47.4	-29.6%
Adams	15.0	13.2	94.8	56.5	-40.4%	Marinette	45.0	25.2	82.2	40.3	-51.0%
Ashland	15.6	17.8	60.8	74.9	23.2%	Marquette	11.4	13.4	67.2	63.2	-5.9%
Barron	33.0	36.6	57.1	58.2	2.0%	Menominee	1.2	1.4	*	*	*
Bayfield	12.2	10.8	66.8	48.9	-26.8%	Milwaukee	678.0	678.0	71.2	68.5	-3.8%
Brown	107.2	130.6	71.9	64.8	-9.9%	Monroe	30.6	30.6	73.2	68.0	-7.1%
Buffalo	12.4	10.2	63.1	50.8	-19.5%	Oconto	31.6	31.0	87.8	70.6	-19.6%
Burnett	9.2	15.0	*	68.0	*	Oneida	27.0	32.0	73.5	63.8	-13.2%
Calumet	16.4	17.0	60.0	44.2	-26.3%	Outagamie	71.4	94.2	61.6	63.7	3.5%
Chippewa	32.8	45.6	57.2	66.9	17.1%	Ozaukee	36.6	48.8	79.2	64.5	-18.5%
Clark	22.6	26.4	50.5	55.7	10.1%	Pepin	9.0	8.6	*	*	*
Columbia	35.6	52.4	59.8	81.6	36.5%	Pierce	21.2	17.8	66.3	60.3	-9.0%
Crawford	13.0	13.8	57.4	58.2	1.4%	Polk	32.4	36.4	69.6	71.0	2.1%
Dane	171.4	214.0	68.8	66.5	-3.4%	Portage	36.4	41.0	74.6	70.9	-4.9%
Dodge	61.8	70.4	71.3	68.2	-4.3%	Price	15.0	18.2	59.0	63.0	6.6%
Door	26.0	32.0	73.3	76.8	4.8%	Racine	93.2	109.4	65.1	59.6	-8.5%
Douglas	29.4	29.0	58.8	51.6	-12.3%	Richland	18.2	17.2	75.2	63.6	-15.4%
Dunn	23.8	22.0	61.3	55.5	-9.5%	Rock	90.2	102.4	72.7	65.2	-10.4%
Eau Claire	47.4	58.2	62.2	60.8	-2.2%	Rusk	14.6	12.8	74.0	56.0	-24.3%
Florence	3.2	4.2	*	*	*	St Croix	33.4	34.0	71.3	64.2	-10.1%
Fond du Lac	66.8	76.4	69.8	66.0	-5.4%	Sauk	37.2	38.0	61.6	56.8	-7.9%
Forest	8.6	6.4	*	*	*	Sawyer	9.8	12.2	*	52.5	*
Grant	45.2	39.6	76.9	63.2	-17.8%	Shawano	36.4	39.0	75.3	65.7	-12.8%
Green	22.4	34.4	59.1	78.1	32.1%	Sheboygan	82.6	90.4	72.8	67.1	-7.8%
Green Lake	15.2	21.8	52.4	66.4	26.7%	Taylor	11.2	12.2	45.7	47.1	3.3%
Iowa	16.2	17.0	71.8	70.2	-2.3%	Trempealeau	23.6	26.0	60.2	59.0	2.0%
Iron	7.8	6.2	*	*	*	Vernon	26.6	25.6	65.1	59.1	-9.1%
Jackson	12.2	19.2	56.5	76.8	35.9%	Vilas	18.6	19.4	70.8	55.3	-22.0%
Jefferson	45.6	55.0	66.7	74.2	11.3%	Walworth	48.4	56.4	61.3	58.1	-5.2%
Juneau	18.0	18.8	65.7	59.0	-10.2%	Washburn	17.0	12.2	91.9	47.5	-48.4%
Kenosha	73.6	98.4	68.8	71.4	3.7%	Washington	54.4	81.0	83.0	80.7	-2.8%
Kewaunee	10.0	15.4	40.6	57.8	42.4%	Waukesha	150.4	198.2	83.2	67.8	-18.5%
La Crosse	71.6	81.4	73.1	72.5	-0.9%	Waupaca	50.4	62.8	69.5	85.6	23.2%
Lafayette	14.4	10.6	78.5	51.8	-34.1%	Waushara	10.4	13.4	36.8	42.3	15.1%
Langlade	14.4	18.0	56.2	57.9	3.1%	Winnebago	85.6	103.2	63.1	62.0	-1.8%
Lincoln	17.6	25.6	47.6	68.0	42.8%	Wood	60.6	51.8	75.4	54.1	-28.2%
Manitowoc	61.8	65.6	67.6	57.8	-14.5%						

Annual average number of deaths calculated by dividing total deaths for the period (1986-1990 and 1996-2000) by five.

All rates are age-adjusted to the US 2000 Standard Population and expressed in deaths/100,000 population (see Technical Notes).

* Rates and percent change are not reported if there were less than 50 deaths over the five-year period.

Percent change measures change in the age-adjusted rate from 1986-1990 to 1996-2000

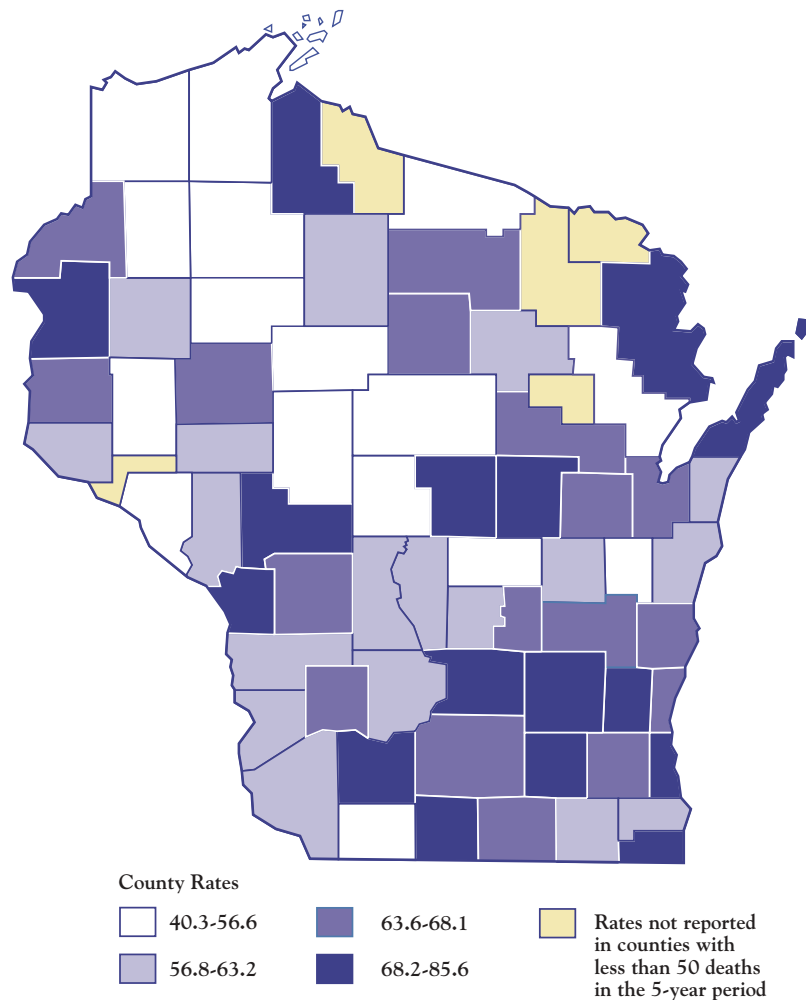
Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

Mortality (Deaths) by County



Map 2:
Age-Adjusted Stroke Mortality Rates, by County,
Wisconsin, 1996-2000

Wisconsin rate: 65.1 deaths/100,000 population



Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

- For stroke, for 1996-2000, there was an average of 3,686 deaths/year for an age-adjusted rate of 65.1/100,000 population.
- The range of the age-adjusted stroke rates among counties was from 40.3 to 85.6 deaths/100,000 population.
- For the period 1986-1990, there was an average of 3,295-stroke deaths/year for a statewide age-adjusted rate of 69.4.
- Statewide mortality from stroke declined 6% between these two time periods. The difference for age-adjusted stroke rates was variable in counties ranging from a decline of 51% to an increase of 43%.

Hospitalizations



Hospitalizations and hospitalization charges may be one measure to examine the economic burden of CVD. In addition to the high death toll, Wisconsin adults who experience heart attack, stroke, or other CVD events, are hospitalized and may have repeated hospitalizations.

In 2000, there were a total of 635,166 inpatient discharges from Wisconsin hospitals (acute care, non-federal hospitals, including general medical/surgical, psychiatric, AODA, rehabilitation and state institutions). Wisconsin residents comprised 96.5% of the discharges and the remaining 3.5% were from other states. Almost 94,000 or 15% of these hospitalizations were for major CVD with total charges of over \$1.6 billion. Table 5 shows hospitalizations, length of stay, and charges by Principal Diagnosis Groups. All other groups included in the table are included in Major CVD and not exclusive groups. Some codes associated with these diagnoses may be included in more than one group e.g. Coronary Heart Disease, Congestive Heart Disease and one code in Hypertensive Disease are included in Diseases of the Heart.

Table 5:
Number of Hospital Discharges, * by Principal Diagnosis Groups,
with Associated Length of Stay and Charges, Wisconsin Hospitals, 2000

Principle Diagnosis Groups **	Total Number	Average Length of Stay (Days)	Total Inpatient Days	Average Charge per Stay	Total Charge of all stays
Major CVD	93,986	4.7	437,759	\$17,419	\$1,637,181,576
Diseases of the Heart	70,025	4.4	308,452	\$18,020	\$1,261,880,412
Coronary Heart Disease	34,642	4.2	144,907	\$22,102	\$765,659,343
Stroke	16,345	4.9	80,613	\$12,532	\$204,829,243
Congestive Heart Disease	15,615	4.9	75,887	\$10,424	\$162,765,899
Hypertensive Disease	2,869	4.4	12,622	\$10,844	\$31,112,017
Arterial Disorders	5,967	7.1	42,080	\$25,599	\$152,747,295

* Includes discharges of persons living or dead.

** These groups are not mutually exclusive. See Technical Notes for associated codes.

Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

- Almost 15% (93,986) of all hospital discharges in Wisconsin were cardiovascular-related.
- These hospitalizations consumed enormous health and financial resources. There were a total of 437,759 days spent in the hospital for a principal diagnosis of CVD, and charges for these admissions totaled over \$1.6 billion.
- For CVD, the average stay was 4.7 days and the average charge per stay was \$17,419. In addition, other costs associated with CVD including long-term care, rehabilitation, medications, lost productivity, and lost family resources that are not reflected in figures listed on Table 5.

Hospitalizations



Table 6 lists the number of hospitalizations and rates for specific racial/ethnic groups. Although whites have a higher rate of hospitalization, caution should be made when making comparisons since these are not age-adjusted rates.

Table 6:
Number of Hospital Discharges and Rates,* by Race/Ethnicity, by Principal Diagnosis Groups, Wisconsin Hospitals, 2000

Principle Diagnosis# Group**	# White	Rate	# Black	Rate	# Asian	Rate	# Am. Indian	Rate	His- panic	Rate
Total CVD	83,961	17.6	4,797	15.8	307	3.5	471	10.0	937	4.9
Diseases of the heart	63,186	13.3	3,319	10.9	224	2.5	379	8.0	682	3.5
Coronary heart disease	31,776	6.7	1,112	3.7	100	1.1	214	4.5	364	1.9
Stroke	14,399	3.0	747	2.5	51	0.6	54	1.1	149	0.8
Congestive heart disease	13,504	2.8	1,288	4.2	54	0.6	84	1.8	186	1.0
Hypertensive disease	1,990	0.4	633	2.1	29	**	11	**	45	**
Arterial disorders	5,289	1.1	305	1.0	13	**	32	**	65	0.3
Diabetes	5,337	1.1	1,000	3.3	39	**	91	1.9	175	0.9

*Rate: These are ratios of the number of discharges per 1,000 population. These discharges may include more than one hospitalization for a person and the discharge categories are not exclusive. See technical notes for associated codes and population denominators. Rates are not reported if there were less than 50 hospitalizations.

** These groups are not mutually exclusive. See Technical Notes for associated codes.

Source: Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

Prevalence of Risk Factors for Cardiovascular Disease - Adults

Many risk factors for cardiovascular disease are modifiable, meaning that individuals may change these factors. Reduction in risk may slow the process of arterial blockage and decrease the risk of a heart attack or stroke. Modifiable risk factors include diabetes, smoking, high blood pressure, high blood cholesterol levels, being overweight, lack of physical activity, and diet.

Prevalence estimates of these risk factors in Wisconsin and the nation are from the Behavioral Risk Factor Surveillance System (BRFSS). This is an annual random digit dialed telephone survey of adults 18 years of age and older in each state to determine the prevalence of risk factors and risk behaviors (see technical notes). Since not all questions are asked in all years, these data are generated from either the 1999 or 2000 survey, depending which year the question was asked.



Table 7: Percent of Adults with Risk Factors for Cardiovascular Disease, Wisconsin, Minnesota, Illinois, and the Nation, including the Nationwide Ranking for Wisconsin, 2000

RISK FACTOR	WI %	MN %	IL %	NATIONWIDE		WI RANK**
				RANGE%	MEDIAN%	
Diabetes	6.1	4.9	6.2	3.1 – 7.6	6.1	26
Smoker	24.1	19.8	22.3	13.1 – 30.5	23.2	37
High blood pressure***	25.0	22.0	26.7	14.2 – 33.5	23.9	33
High cholesterol***	31.6	31.3	31.8	21.2 – 37.1	30.0	39
Overweight (includes obese)	57.8	55.0	58.9	48.0 – 61.7	56.9	31
Lack of regular physical activity	76.9	79.5	79.4	70.8 – 85.7	78.2	19
< than 5 fruits & vegetables/day	78.3	75.7	76.7	63.1 – 92.8	73.3	36

* Range is the percentage of adults with this risk factor reported for the lowest and highest state; median is the percentage reported by the state in the middle.

** WI Rank: This is the Wisconsin rank out of 52 (50 states, District of Columbia, and Puerto Rico). A rank of 1 would be the state/territory reporting the lowest percentage of adults with this risk factor (or the best); 52 would be the state/territory reporting the highest percentage of adults with this risk factor.

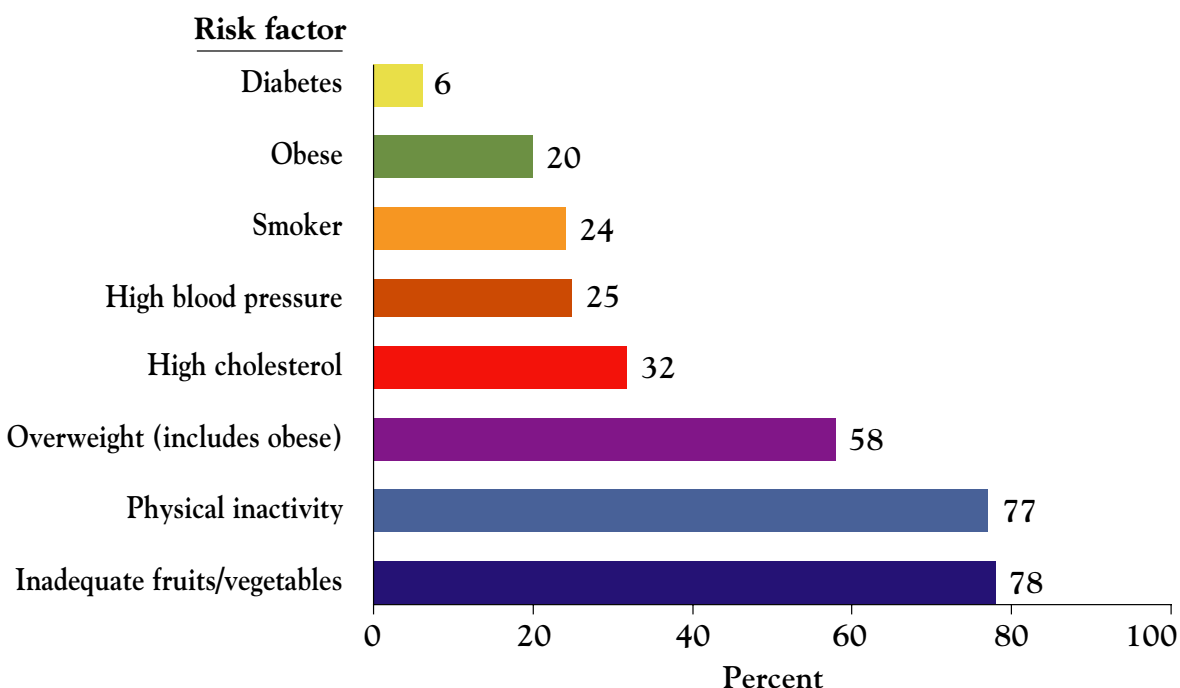
*** These data were from 1999; all other data were from 2000.

Source: Behavioral Risk Factor Surveillance System Centers for Disease Control

- The actual differences in the prevalence of certain risk factors are small, when compared with neighboring states and the nationwide median. Wisconsin ranks below the national median for all of the above risk factors, except diabetes and regular physical activity.

Prevalence of Risk Factors for Cardiovascular Disease - Adults

Figure 9: Percent of Adults with Risk Factors for Cardiovascular Disease, Wisconsin, 2000



DIABETES

- Six percent of adults in Wisconsin report they have been told by a health professional that they have diabetes. Two-thirds of people with diabetes die of some form of heart or blood vessel disease.²

TOBACCO SMOKE

- The prevalence of cigarette smoking among Wisconsin adults in 2000 was 24%. This percentage has remained relatively constant over the past decade (range: 23-26%),³ despite public awareness of the detrimental effects of smoking.
- In 2000, fifteen percent, or 2,680 heart disease and stroke deaths in Wisconsin were attributed to smoking. This comprises 36% of all smoking attributable deaths.⁴

HIGH BLOOD PRESSURE

- High blood pressure is a major risk factor for both heart disease and stroke. One in four Wisconsin adults report having been told by a health professional that they have high blood pressure.
- A national report shows that of those with high blood pressure, 32% are actually unaware they have high blood pressure, 27% are on medication and are controlled, 26% are on medication but do not have their blood pressure controlled, and 15% are not on medication.⁵

Prevalence of Risk Factors for Cardiovascular Disease - Adults

HIGH BLOOD CHOLESTEROL

- High blood cholesterol contributes to atherosclerosis, the gradual build up of fatty plaques in the arteries that may lead to heart attack and stroke. Almost one in three Wisconsin adults have been told by a health professional that they have high cholesterol.
- A ten percent decrease in total cholesterol levels may result in an estimated 30 percent reduction in coronary heart disease.⁶



OVERWEIGHT (INCLUDING OBESITY)

- Fifty-eight percent of adults in Wisconsin are overweight. This includes 20% of adults that are obese.
- These estimates are calculated as Body Mass Index (BMI) based on a person's reported height and weight (see Technical Notes). Overweight is defined as a BMI of 25 or greater and obesity is defined as a BMI of 30 or greater.
- In the past decade, the percent of Wisconsin adults who are overweight, but not obese has remained rather constant with 36% in 1990 to 38% in 2000. The percent that are obese has almost doubled from 11% in 1990 to 20% in 2000.³

PHYSICAL INACTIVITY

- Many adults in Wisconsin are not physically active on a regular basis. Seventy-seven percent report they do not get regular physical activity (at least 30 minutes of moderate intensity physical activity on most days of the week). Only 23% report getting regular physical activity.
- The relative risk of coronary heart disease associated with physical inactivity ranges from 1.5 to 2.4, an increase risk comparable to that observed for high blood pressure, high blood cholesterol, or cigarette smoking.⁷
- Less active persons have a 30-50% greater risk of developing high blood pressure.⁸

INADEQUATE FRUITS AND VEGETABLES (NUTRITION)

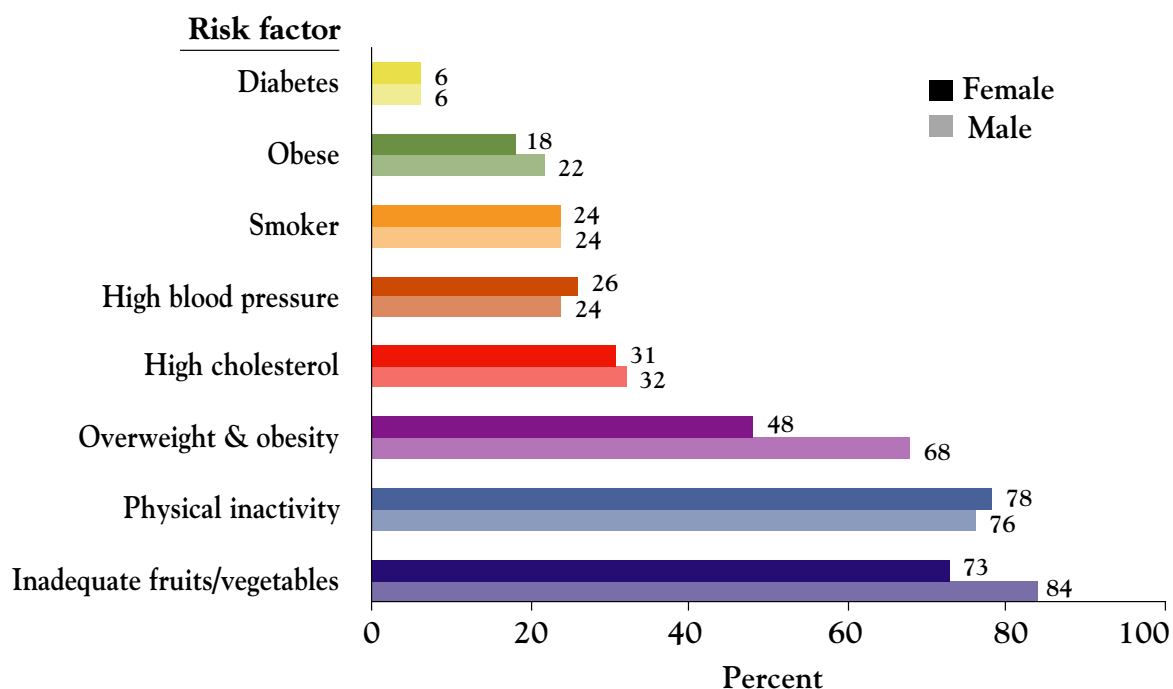
- Good nutrition is important for preventing heart disease and stroke. Healthy food habits help maintain normal blood pressure, desirable blood cholesterol levels and a healthy body weight.

Seventy-eight percent of Wisconsin adults report not eating five servings of fruits and/or vegetables a day. Therefore, only 22% of adults report eating adequate fruits and vegetables.

Refer to the section (Figure 11) with analysis of the optional Cardiovascular Health Module asked in the 1999 BRFS for additional information on diet and exercise.

Prevalence of Risk Factors for Cardiovascular Disease - Adults

Figure 10: Percent of Adults with Risk Factors for Cardiovascular Disease, by Sex, Wisconsin, 2000



Source: Wisconsin Behavioral Risk Factor Surveillance System 1999 (blood pressure and cholesterol estimates) and 2000, Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

- There is little difference in prevalence between males and females for most of these cardiovascular risk factors. However, the prevalence of overweight is 68% in males compared to 48% in females.
- Although a large percentage of males and females do not eat adequate fruits and vegetables, males are less likely than females to report eating five servings of fruits and/or vegetables a day.

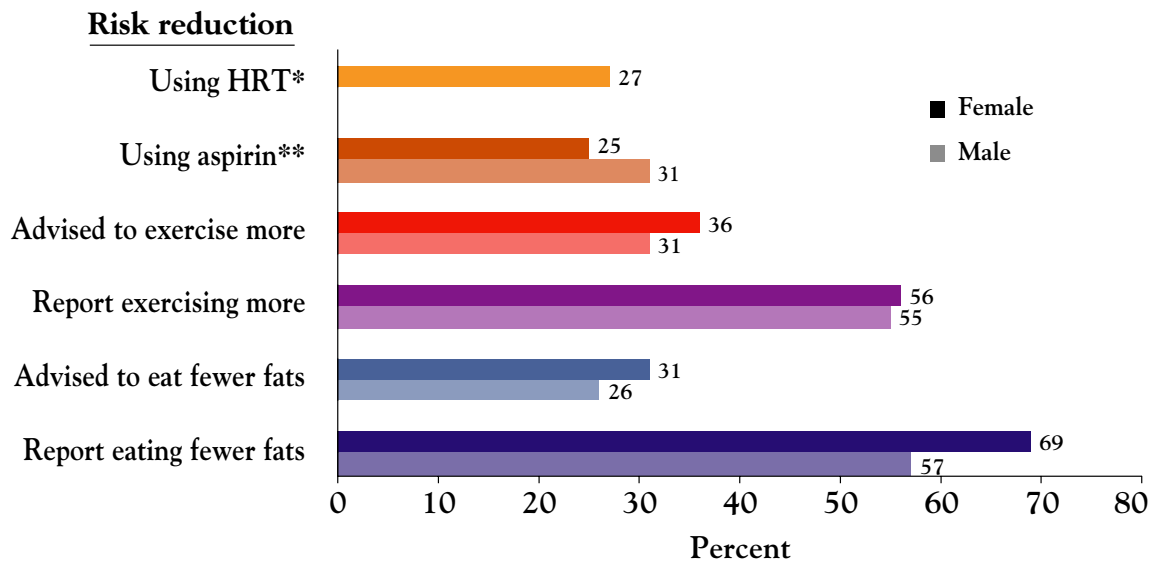
In 1999, 2,177 adults in Wisconsin responded to a specialized Cardiovascular Health Module that was part of the Behavioral Risk Factor Survey. The CVH module questions refer to heart disease, stroke, and behaviors related to reducing risk factors. According to the survey:³

- Overall 4.2% indicated a doctor had told them they had had a heart attack or myocardial infarction; 77% of the sample were 55 or older, but 17% were 45-54 years old.
- Almost four percent (3.8%) had been told they had had angina or coronary heart disease; 78% of the sample were 55 years or older.
- Overall 1.9% indicated that they had had a stroke.

Prevalence of Risk Factors for Cardiovascular Disease - Adults

The following section discusses advice received from a doctor to take action to reduce risks and self-reported behaviors to reduce the risks of heart disease and stroke. In addition, some age-specific data are discussed but not presented.

Figure 11:
Percent of Adults Advised or Reporting They Have Modified Behaviors to Reduce Risk of CVD, by Sex, Wisconsin, 1999



Source: Wisconsin Behavioral Risk Factor Surveillance System 1999 (Cardiovascular Health Module) Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

*HRT = Hormone Replacement. Limited to women 35 years old and older who have gone or are going through menopause and not taking birth control pills.

** Limited to 35 years old and older

- Overall 26% of males and 31% of females reported they had been advised by a doctor to eat fewer fatty and high cholesterol foods. Although this advice was most prevalent among older individuals, the recommendation was made to less than 50% of adults 45 years of age and older, and not made to persons 18-34 years.
- With or without a recommendation from a doctor, 57% of males and 69% of females report they are eating fewer fatty and high cholesterol foods. This behavior extends to adults in younger age groups as well.
- Although only 31% of males and 36% of females report a recommendation from a doctor to get more exercise, 55% of males and 56% of females report they are exercising more, this behavior extends to adults in the younger age groups as well.

Prevalence of Risk Factors for Cardiovascular Disease - Adults

Two other cardiovascular disease strategies have been widely discussed in recent years. The strategies are low dose aspirin therapy and estrogen replacement therapy. These have been suggested as both primary and secondary prevention strategies. Although a recent paper has clearly shown that the risks, including increased risk of heart attack and stroke, associated with combined hormone replacement therapy may outweigh the benefits,⁹ the data presented here were collected in 1999 and are reported.

Table 8: Reasons for Aspirin Use, Wisconsin, 1999

Reason for Aspirin Use*	Men	Women	Total
Relieve Pain	31%	25%	28%
Reduce Risk of Heart Attack	80%	68%	74%
Reduce Risk of Stroke	64%	57%	61%

Twenty-eight percent of adults 35 years of age or older reported taking aspirin at least every other day. Reasons for aspirin use among this 28% of adults are in Table 8.

Table 9: Reasons for Non-Aspirin Use, Wisconsin, 1999

Reason for Non-Aspirin Use*	Total
Health Reasons Other Than Stomach Problems	7%
Health Reasons for Stomach Problems	7%

Seventy-two percent of adults 35 years of age or older reported not taking aspirin at least every other day. Reasons for non-aspirin use among this 72% of adults are in Table 9.

Table 10: Reasons for Estrogen Use, Wisconsin, 1999

Reason for Taking Estrogen*	Percentage
Reduce the Risk of Heart Attack	31%
Treat Symptoms of Menopause	68%
Reduce Bone-thinning or Osteoporosis	76%

Twenty-seven percent of non-pregnant females age 35 years of age or older who have gone through or are going through menopause, and not taking birth control pills report estrogen use. Reasons given by these 27% of women for taking estrogen are in Table 10.

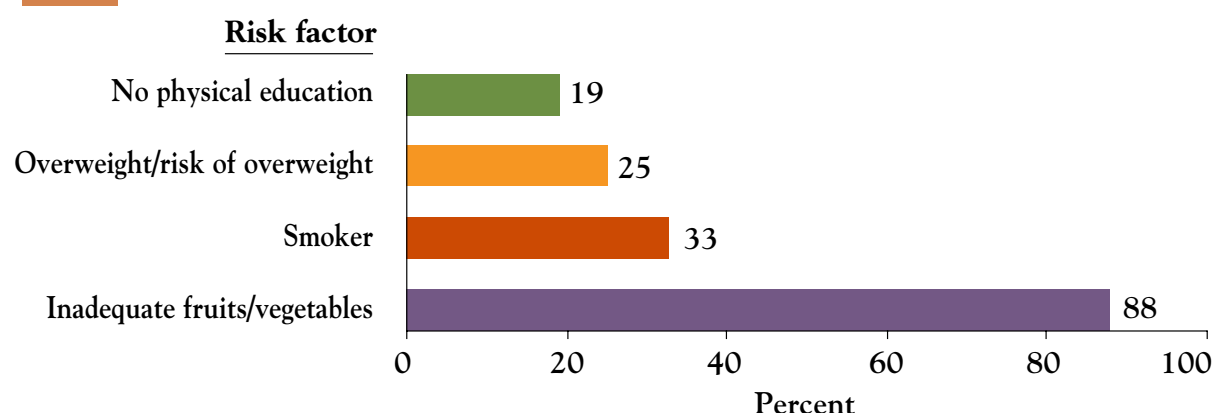
* Categories are not exclusive

Source: Wisconsin Behavioral Risk Factor Surveillance System 1999 (Cardiovascular Health Module), Research and Methods Section, Bureau of Health Information, DHCF, Wisconsin Department of Health and Family Services

Prevalence of Risk Factors for Cardiovascular Disease - Youth

Many of the risk factors for cardiovascular disease are established in youth. The following are data from the 2001 Wisconsin Youth Risk Behavior Survey (YRBS). This is a random survey conducted every two years among public schools with grades 9-12. In 2001 the survey was administered to 2,120 students in 54 public schools.³

Figure 12: Percent of High School Students with Risk Factors for Cardiovascular Disease, Wisconsin, 2001



Source: 2001 Wisconsin Youth Risk Behavior Survey, Division of Learning Support, Wisconsin Department of Public Instruction

PHYSICAL ACTIVITY

- Nineteen percent of students report not being enrolled in physical activity at school.
- Sixty-four percent of students report participating in strenuous physical activity that made them sweat and breathe hard for at least 20 minutes on three or more of the previous seven days.
- Twenty-seven percent report having moderate physical activity on at least five of the seven previous days.

OVERWEIGHT

- Twenty-five percent of high school students are defined as overweight or at risk for being overweight. In adolescents, overweight is defined as sex- and age-specific BMI at 95th percentile or greater based on the Centers for Disease Control and Prevention growth charts. A BMI at greater than or equal to the 85th percentile but less than the 95th percentile designates an adolescent at risk for overweight (see Technical Notes).

TOBACCO SMOKE

- One-third (33%) of high school students report smoking cigarettes at least one day of the past 30. This includes a range of 21% for ninth graders to 44% for twelfth graders.
- Fewer students report smoking in 2001 than in 1999 (33% vs. 38%).

INADEQUATE FRUITS AND VEGETABLES (NUTRITION)

- Eighty-eight percent of students do not eat five servings of fruits and/or vegetables in a day.

Summary



This report summarizes the most recent information available on cardiovascular disease, coronary heart disease, stroke deaths, hospitalizations, and associated risk factors in Wisconsin. The data presented demonstrate a need for efforts to prevent and reduce complications of cardiovascular disease. The trend in declining rates for CVD deaths is leveling and the documented prevalence of unhealthy behaviors puts Wisconsin adults at increased risk for heart disease and stroke.

Healthiest Wisconsin 2010: A Partnership Plan to Improve the Health of the Public has identified the eleven health priorities.¹¹ They influence both health and illness and each have behavioral, environmental, and societal dimensions. The health and system priorities are interwoven, complementary, and crosscutting.

- Access to Primary and Preventive Health Services
- Adequate and Appropriate Nutrition
- Alcohol and Other Substance Use and Addiction
- Environmental and Occupational Health Hazards
- Existing, Emerging, and Re-Emerging Communicable Diseases
- High Risk Sexual Behavior
- Intentional and Unintentional Injuries and Violence
- Mental Health and Mental Disorders
- Overweight, Obesity, and Lack of Physical Activity
- Social and Economic Factors that Influence Health
- Tobacco Use and Exposure

These health priorities significantly affect a number of key conditions. They have the greatest potential leverage for improving the health of the people of Wisconsin. By reducing one risk factor, many diseases or other health conditions may often be improved or eliminated. For example, tobacco has a major influence on the development of cardiovascular disease, lung cancer, and asthma. Similarly, reducing the prevalence of overweight and obesity and increasing physical activity are key in the prevention of cardiovascular disease, diabetes and other conditions. Addressing tobacco, overweight and obesity, and physical activity, influences a great number of health conditions and diseases because there are common underlying causes.

These eleven health priorities are important for all Wisconsin residents. Addressing them requires intensive collaborative action by many partners in Wisconsin's private and public health sectors. Collectively they require primary prevention approaches on both individual and population-based levels. Clinicians can identify actual and potential risk for individuals and provide health promotion and disease prevention guidance and intervention. Population-based interventions are complex and public health system partners need to be concerned not only with the determinants of health, but also with the social determinants of health.

Multiple intervention approaches that include education, social support, laws, policies, incentives, and behavioral change, and multiple levels of influence to include individuals, families, local communities, and the entire Wisconsin population are needed.

Ideally, impacting the determinants of health for cardiovascular disease requires coordination of epidemiological science and public health practice. Linkages need to be made between local health departments, a Wisconsin Cardiovascular Health Plan and Healthiest Wisconsin 2010. The Cardiovascular Surveillance Report - 2002 will provide a baseline to monitor progress and provide a basis for program planning, evaluation and measurement of changes in health status.



MORTALITY DATA

Mortality data for Wisconsin (1980-2000) are from the Bureau of Health Information, Division of Health Care Financing, Wisconsin Department of Health and Family Services. The source of these data is resident death certificates filed with the State Registrar, Vital Records Section, Bureau of Health Information, Division of Health Care Financing, Department of Health and Family Services, as mandated by Chapter 69 of the Wisconsin Statutes. Most resident deaths occurred in Wisconsin, although the death file includes certificates for Wisconsin residents who died in other states and countries as well. The Bureau of Health Information produces an annual report, *Wisconsin Deaths*, which provides key information about deaths of Wisconsin residents. Additional information about mortality data can be obtained at <http://www.dhfs.state.wi.us/deaths/index.htm>. The national trend data were provided by the American Heart Association (AHA), Biostatistics Consultant, National Center, Dallas Texas.

Prior to 1999, causes of death were coded using the International Classification of Diseases, Ninth Revision (ICD 9). Beginning in 1999, causes of death were coded using the International Classification of Diseases, Tenth Revision (ICD 10). For this report cause of death refers to "Underlying Cause of Death". The code groups used include:

- Major cardiovascular disease (ICD9: 390-448; ICD10: I00-I78)
- Disease of the heart (ICD9: 390-398, 402, 404-429; ICD10: I00-I09, I11, I13-I51)
- Ischemic (coronary) heart disease (ICD9: 410-414.9, 429.2; ICD10: I20-I25)
- Congestive heart failure (ICD9: 428; ICD10: I50)
- Cerebrovascular disease (Stroke) (ICD9: 430-438; ICD10: I60-I69)
- Diabetes (ICD9: 250; ICD10: E10-E14)

Additional codes used in Table 1:

- Hypertensive heart disease (ICD10: I11, I13)
- Other diseases of the heart (ICD10: I00-I09, I26-I49, I51)
- Primary hypertension/hypertensive renal disease (ICD10: I10, I12)
- Atherosclerosis (ICD10: I70)
- Other diseases of the circulatory system (ICD10: I71-I78)

Please note that these categories are not exclusive. Also, Wisconsin and AHA data vary slightly in the codes that were included for coronary heart disease; AHA did not include ICD 429.2 in their analysis of rates from 1980-1998. Rates for 1999 utilized ICD10 codes, which are inclusive of ICD 429.2.

For data presented by county or by racial/ethnic group the rates were calculated by combining deaths for a five year period (1986-1990 or 1996-2000) to allow for sufficient deaths to calculate a rate. The standard categories used in this report reflect the availability of racial and ethnic data in Wisconsin. All racial group categories are 'race only' categories which exclude Hispanics/Latinos whereas the Hispanic/Latino category includes all races. In other words, a death is counted in a racial/ethnic category only once. For example, the death of a Hispanic/Latino white would be counted in the Hispanic/Latino category and not the white category. Other refers to any deaths not represented in the other categories. For the purposes of this report a rate was calculated if there were at least 50 deaths in the five year period. Rates were not reported if there were less than 50 deaths in a five-year period.

Mortality data includes deaths of all ages, and rates are age-adjusted to the 2000 US standard population.



HOSPITALIZATIONS

Hospitalization information is from the Bureau of Health Information, Division of Health Care Financing, Wisconsin Department of Health and Family Services 2000 Inpatient Hospital Discharge Database. These data are reported to the Bureau of Health Information pursuant to Chapter 153, Wisconsin Statutes, and Chapter HFS 120, Wisconsin Administrative Code. The reported information contains patient demographic data, admission and discharge data, charge and payer data, and diagnosis and procedure data. Data are reported by all of Wisconsin's acute care, non-federal hospitals, including general medical/surgical, psychiatric, AODA, rehabilitation and state institutions. Additional information about hospital inpatient data can be obtained at <http://www.dhfs.state.wi.us/healthcareinfo/>.

These data include all ages (children as well as adults). Hospitalization records are based upon the county of residence of the person hospitalized – not the county where the person is hospitalized. Hospitalizations for non-Wisconsin residents are included (3.5% of hospitalizations), but Wisconsin residents hospitalized outside of Wisconsin are not included.

The categories for this section utilized the following ICD-9 codes for the “Principal Diagnosis Code”:

- Major cardiovascular disease (ICD9: 390-448)
- Disease of the heart (ICD9: 390-398, 402, 404-429)
- Ischemic (coronary) heart disease (ICD9: 410-414)
- Congestive heart failure (ICD9: 428)
- Cerebrovascular disease (Stroke) (ICD9: 430-438)
- Diabetes (ICD9: 250)
- Hypertensive disease (ICD9: 401-404)
- Arterial disorders (ICD9: 440-448)

Please note that these categories are not exclusive. Discharges include people living and dead.

Rates reported are a ratio of the number of inpatient discharges over the specific population and reported per 1,000 population. This is a ratio because a person hospitalized more than once will be counted more than once. See the section on Wisconsin population for the denominators used to calculate these ratios. Rates were not reported if there were less than 50 hospitalizations.

ADULT RISK FACTORS

All adult risk factor data are from 2000 Wisconsin Behavioral Risk Factor Survey (BRFS), except for high blood pressure, high cholesterol and the optional Cardiovascular Module, which are from the 1999 Wisconsin BRFS. Risk factor information includes only those persons 18 years and older. The Wisconsin BRFS is part of the national Behavioral Risk Factor Surveillance System (BRFSS). It is an annual telephone-administered health survey coordinated by the U.S. Centers for Disease Control and Prevention. Wisconsin BRFS data collection is managed by the DHFS Bureau of Health Information. The BRFS data used in this report are weighted to adjust for disproportional sampling. Additional information about the Wisconsin BRFS can be obtained at <http://www.dhfs.wi.us/stats/BRFS.htm>.



Body mass index (BMI) is defined as weight in kilograms divided by height in meters squared (kg/m^2). For this report, obese is defined as a BMI of 30 or greater and overweight is defined as a BMI of 25 or greater. Therefore, the percentage of persons who are overweight includes those who are obese. The definition of high blood pressure is the percentage of persons who answered “Yes” to the question “Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?” The definition of high cholesterol is the percentage of persons who answered “Yes” to the question “Have you ever been told by a doctor or other health professional that your blood cholesterol is high?” The definition of lack of physical activity is less than 30 minutes of moderate physical activity most days of the week. The definition of current smoker is the percentage of persons who have ever smoked 100 cigarettes in their lifetime and reported smoking every day or some days. The definition of less than 5 servings of fruit/vegetables is the percentage of persons who report they do not consume five or more servings a day.

In addition, in 1999, the BRFSS included an optional Cardiovascular Module. The module included questions on prevalence of previous heart attack or myocardial infarction, angina or coronary heart disease, or previous stroke, physical activity advice from a doctor, and diet and physical activity practice. Questions on aspirin usage were limited to respondents 35 years and older and use of hormone replacement therapy to women 35 years and older who were past or going through menopause and not pregnant or taking birth control pills.

YOUTH RISK FACTORS

All youth risk factor data are from 2001 Wisconsin Youth Risk Behavior Survey (YRBS). The YRBS is conducted among students in grades 9-12 in regular public schools. Systematic equal probability sampling with a random start was used to select classes from each school that participated in the survey. In Spring 2001, the survey was administered to 2120 students from 54 schools. The response rate was adequate to use these results to make estimates concerning all public high school students. In adolescents, overweight is defined as sex- and age-specific Body Mass Index (BMI) at 95th percentile or above based on the Centers for Disease Control and Prevention growth charts. BMI at the 85th percentile or greater designates a child or adolescent at risk for being overweight. The BMI is calculated by the survey administrator based on the student's self reported height and weight. The definition of current smoker is having smoked tobacco on one or more of the previous 30 days. The definition of less than 5 servings of fruit/vegetables is the percentage of persons who report they do not consume five or more servings a day. All percentages are rounded to the nearest whole percent.

POPULATION DATA AND AGE ADJUSTMENT

The age distribution of a population changes over time and from place to place. Because some diseases like coronary heart disease and stroke are more common in older people, comparing rates of populations, counties, or over time can be misleading if the age distributions of the populations being compared are different. In order to make appropriate comparisons the rates are age-adjusted.

A rate is age-adjusted by applying an age-specific rate of the population of interest to a standard population, thus estimating the number of deaths that would occur in a standard population if it had the same age-specific rate. For the five-year composite data (1986-2000 and 1996-2000) the Wisconsin population estimates for 1988 and 1998 were used to calculate the age- and race-specific rates. For the trend data, age-specific rates were calculated using population estimates for each year. Because Wisconsin population estimates from Wisconsin Bureau of Health Information may be more accurate than estimates from other sources, the rates may differ from those published nationally but should be a more accurate representation. Finally, all rates are standardized against the US 2000 standard population.

Technical Notes



Age-adjusted rates by county were calculated for a five-year period since counties with small populations had too few deaths to calculate rates for a shorter interval. As noted, there are still some counties that had fewer than 50 deaths in the five-year period; rates are not given for these counties. Although the rates are age-adjusted, caution should be taken when comparing one county to another, as counties with small populations and few numbers of deaths are more likely to have a wider variation in rates. Using a five-year average to calculate the rate should help this variation.

WISCONSIN POPULATION

Population figures are 2000 census counts from the United States Census Bureau, provided by the Wisconsin Division of Health Care Financing, Bureau of Health Information.

These numbers provide the reader with the racial and ethnic profile of Wisconsin and were used as denominators for the hospitalization rates.


Wisconsin Population by Race/Ethnicity and Sex, April 1, 2000

RACE	MALE	FEMALE	TOTAL	HISPANIC/ LATINO TOTAL
White	2,352,880	2,416,977	4,769,875	88,227
Black/African American	147,206	157,254	304,460	4,215
American Indian	23,462	23,766	47,228	3,248
Asian	44,070	44,693	88,763	768
Native Hawaiian/ Other Pac. Islander	836	794	1,630	284
Some Other Race	46,884	37,958	84,842	81,205
Two or More Races	33,703	33,192	66,895	14,974
Total	2,649,041	2,714,634	5,363,675	192,921

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